

From the  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITYThe Firm of  
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**PCT**NOTIFICATION OF TRANSMITTAL OF  
INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT

(PCT Rule 71.1)

Date of Mailing  
(day/month/year)**04 OCT 2004**

Applicant's or agent's file reference

SCHULMAN 10

**IMPORTANT NOTIFICATION**

International application No.

International filing date (day/month/year)

Priority date (day/month/year)

PCT/US03/29295

19 September 2003 (19.09.2003)

19 September 2002 (19.09.2002)

Applicant

A. SCHULMAN, INC.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.
4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices)(Article 39(1))(see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/US

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Form PCT/IPEA/416 (July 1992)

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## PATENT COOPERATION TREATY

## PCT

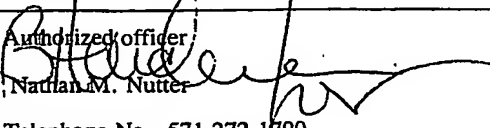
## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 06 OCT 2004

WIPO

PCT

Applicant's or agent's file reference <b>SCHULMAN 10</b>	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. <b>PCT/US03/29295</b>	International filing date (day/month/year) <b>19 September 2003 (19.09.2003)</b>	Priority date (day/month/year) <b>19 September 2002 (19.09.2002)</b>
International Patent Classification (IPC) or national classification and IPC <b>IPC(7): C08F 8/0; C08L 9/00, 23/04, 25/02, 33/02, 33/04, 35/00, 35/02, 43/00 and US Cl.: 525/191, 201, 207, 222, 232, 240, 241</b>		
Applicant <b>A. SCHULMAN, INC.</b>		
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>3</u> sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of <u>5</u> sheets.</p>		
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the report</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of report with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>		
Date of submission of the demand <b>13 April 2004 (13.04.2004)</b>	Date of completion of this report <b>13 September 2004 (13.09.2004)</b>	
Name and mailing address of the IPEA/US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230	Authorized officer  Nathan M. Nutter Telephone No. 571-272-1700	

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US03/29295

## I. Basis of the report

## 1. With regard to the elements of the international application:\*

- ☐ the international application as originally filed.
- ☒ the description:  
pages 1-15 as originally filed  
pages NONE, filed with the demand  
pages NONE, filed with the letter of \_\_\_\_\_.
- ☒ the claims:  
pages NONE, as originally filed  
pages NONE, as amended (together with any statement) under Article 19  
pages NONE, filed with the demand  
pages 16-20, filed with the letter of 19 August 2004 (19.08.2004)
- ☐ the drawings:  
pages NONE, as originally filed  
pages NONE, filed with the demand  
pages NONE, filed with the letter of \_\_\_\_\_.
- ☐ the sequence listing part of the description:  
pages NONE, as originally filed  
pages NONE, filed with the demand  
pages NONE, filed with the letter of \_\_\_\_\_.

## 2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language \_\_\_\_\_ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

## 3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in printed form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages NONE
- ☐ the claims, Nos. NONE
- ☐ the drawings, sheets/fig NONE

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\*

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.  
PCT/US03/29295**V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. STATEMENT**

Novelty (N)	Claims <u>1-25</u>	YES
	Claims <u>NONE</u>	NO
Inventive Step (IS)	Claims <u>1-25</u>	YES
	Claims <u>NONE</u>	NO
Industrial Applicability (IA)	Claims <u>1-25</u>	YES
	Claims <u>NONE</u>	NO

**2. CITATIONS AND EXPLANATIONS**

Claims 1-25 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest the manufacture of a polyolefin blend composition comprising an interfacial agent/compatibilizer and a polyethylene-metal salt which is the product of ethylene acid copolymer or terpolymer and a metal salt, neutralized as recited and claimed.

Claims 1-25 meet the criteria set out in PCT Article 33(4), and thus possess industrial applicability because the subject matter claimed can be made or used in industry.

----- NEW CITATIONS -----

We claim:

1. A polyolefin blend comprising a propylene containing polymer,  
  
an interfacial agent/compatibilizer which may be functionalized, and  
  
an ethylene-based polyolefin-metal salt which is the product of ethylene acid copolymer or terpolymer and a metal salt, the polyolefin-metal salt being an ionomer, an alpha, beta ethylenically unsaturated carboxylic acid polymer in which the acid units are neutralized with metal ion(s).
2. The polyolefin blend of claim 1, wherein the propylene polymer may be at least one of a homopolymer polypropylene or a random or block copolymer of propylene and ethylene, and the polyolefin blend may be from about 10 to 80 weight percent of the propylene polymer, from about 1 to 50 weight percent of the ethylene copolymer, and from about 5 to 60 weight percent of the polyolefin-metal salt.
3. The polyolefin blend of claim 1, wherein the propylene polymer, for optimal hardness and scratch resistance, consists essentially of from 40 to 75 weight percent of the propylene polymer; from about 1 to 25 weight percent of the ethylene copolymer; and from 5 to 35 weight percent of the polyolefin-metal salt of the blend.
4. The polyolefin blend of claim 1, wherein the interfacial agent is an elastomer.
5. The polyolefin blend of claim 4, wherein the elastomer is an ethylene copolymer crosslinked with peroxide or silane with a catalyst selected from the transition metals of Group VIII, including complexes of these metals, this material optionally crosslinked prior to compounding or in situ.

6. The polyolefin blend of claim 5, wherein the ethylene copolymer is a crosslinked/partially vulcanized thermoplastic elastomer.
7. The polyolefin blend of claim 1, wherein the propylene polymer is selected from at least one of a homopolymer propylene, a random or block copolymer of propylene, and ethylene, and the polyolefin blend may be from about 5 to 75 weight percent of the propylene polymer, from about 1 to 50 weight percent of the ethylene copolymer, and from about 5 to 65 weight percent of the polyolefin-metal salt.
8. The polyolefin blend of claim 1, wherein the interfacial agent is selected from a styrene-ethylene interpolymers, styrenic block copolymer or elastomer, and a random styrenic copolymer or elastomer, all of which may have been modified with maleic anhydride.
9. The polyolefin blend of claim 8, wherein the styrenic copolymers, interpolymers or elastomers modified with maleic anhydride represent between 1 to about 30 weight percent of the blend.
10. The polyolefin blend of claim 1, further comprising an ethylene vinyl acetate (EVA) with a vinyl acetate level between 5 to 80 weight percent with maleic anhydride or hydroxy ethyl acrylate.
11. The polyolefin blend of claim 10, wherein the functionalized ethylene vinyl acetate represents between 1 to 30 weight percent of the blend.
12. The polyolefin blend of claim 1, further comprising one or more terpolymers or copolymers of ethylene, butyl acrylate, and glycidyl methacrylate (GMA); terpolymers of ethylene, ethyl, methyl, or butyl acrylate, and maleic anhydride (MAH); terpolymers of ethylene, acrylic ester, and maleic anhydride.
13. The polyolefin blend of claim 12, wherein the MAH (unsaturated anhydride) and acrylate (GMA) may be physically crosslinked prior to addition to blend or in situ.

14. The polyolefin blend of claim 1, wherein the interfacial agent is selected from the group consisting of modified acrylate copolymers and terpolymers.
15. The polyolefin blend of claim 14, wherein the modified acrylate copolymers or terpolymers may react with the free acid of the ionomer component.
16. The polyolefin blend of claim 15, wherein the modified acrylate copolymers or terpolymers represent between 1 to 30 weight percent.
17. The polyolefin blend of claim 1, wherein the polyolefin-metal salt is a copolymer or terpolymer ionomer, which is partially neutralized with a metal salt from 5 to 95%.
18. The polyolefin blend of claim 17, wherein the terpolymer ionomer is modified with methyl, butyl, or ethyl acrylate; wherein the acrylate content is from 1 to 25 weight percent.
19. The polyolefin blend of claim 18, wherein the acrylate content represents between 10 and 25 weight percent.
20. The polyolefin blend of claim 1, wherein the metal ion is selected from the group consisting of lithium, sodium, potassium, magnesium, calcium, barium, lead, tin, zinc, aluminum, cadmium, and mixtures thereof.
21. The polyolefin blend of claim 1, wherein the ethylene copolymer includes a low molecular weight ionomer wax or functionalized monomer representing from about 1 to 20 weight percent.
22. The polyolefin blend of claim 1, further comprising a filler from about 1 to 40 weight percent.
23. The polyolefin blend of claim 22, wherein the mineral filler is selected from talc, calcium carbonate, wollastonite, calcium sulfate, barium sulfate, metal fibers, nanocomposites, ceramic fibers and powders, polymeric fibers, crosslinked polymers, mica, silica, carbon

fibers, metal fibers, clay, glass fibers, glass spheres, conductive fillers such as polyaniline, and sulfonated materials including AMPS.

24. The polyolefin blend of claim 1, further comprising a surface and mold release agent including high molecular weight silicone and silicone masterbatches, fatty acids (including oleyl palmitamide, erucamide, and behanamide) representing from about 0.1 to 10 weight percent.

25. A process for preparing an article from a polyolefin blend consisting essentially of:

providing a propylene polymer containing polymer,

adding a compound which may act as an interfacial agent/compatibilizer selected from at least one of: ionomer waxes or functionalized monomers; impact modifiers and functionalized modifiers; a styrenic copolymer or elastomer with maleic anhydride grafting; ethylene vinyl acetate modified with maleic anhydride or hydroxyl ethyl acrylate; terpolymers or copolymers selected from one or more of ethylene, butyl acrylate, and glycidyl methacrylate; terpolymers of ethylene, ethyl, methyl, or butyl acrylate, and maleic anhydride; ethylene-propylene rubber with maleic anhydride grafting, the ionomer portion may be a copolymer or terpolymer modified with acrylate;

adding an ethylene based polyolefin-metal salt that is a reaction product of an ethylene containing polymer and a second organic monomer containing a hydrophilic moiety; such component being at least partially neutralized with a metal salt between 5 to 95%;

mixing the interfacial agent/compatibilizer until partially or completely crosslinked and adding to the blend; or

crosslinking in situ while adding the propylene polymer and polyolefin-metal salt; or

mixing the propylene polymer, interfacial agent/compatibilizer, and poly-olefin metal salt; and



injection molding, blow molding or extruding the blend into an article which will display high scratch resistance, low blushing upon impact, low temperature requirements when mandated, tape adhesion, molded in color, controlled gloss levels, superior weatherability, and sonic welding capabilities.